

EFED Revised Ecological Risk Assessment for Pirimiphos-methyl

1. Use Characterization

Pirimiphos methyl is an organophosphorous insecticide used to control a wide range of pests. It is used in cattle ear tags, iris bulbs, stored corn and sorghum grain, and as a seed treatment (field corn, pop corn, and sorghum). Only the seed treatment is expected to result in significant exposure to terrestrial wildlife. Several million acres in the U.S. are planted each year with corn and sorghum seeds treated with pirimiphos methyl. Pirimiphos-methyl is available in an emulsifiable concentrate and incorporated into plastic ear tags.

2. Exposure Characterization

Environmental Fate Assessment

Pirimiphos-methyl O-(2-(Diethylamino)-6-methyl-4-pyrimidinyl) O,O-dimethyl phosphorothioate is an organophosphate insecticide that has indoor, animal eartag and seed/bulb treatment uses only. The seed and bulb treatments are intended to preserve seed and bulbs during storage with no claimed benefits of pest control after planting. Therefore, the only significant environmental exposure from use of pirimiphos-methyl according to label directions may be exposure to terrestrial wildlife from ingestion of treated seeds.

Hydrolysis (161-1) is the only environmental fate data requirement for indoor use chemicals. Pirimiphos-methyl hydrolyzes rapidly at acidic pHs and is relatively stable at neutral and alkaline pH; calculated half-lives were 7.3 days at pH 5, 79.0 days at pH 7, and 54.0-62.0 days in pH 9. The main hydrolysis degradate recovered from all three pH's was 2 (diethylamino)-4-hydroxy-6-methyl pyrimidine which did not retain the organophosphate moiety. A second degradate, O-2-diethylamino-6-methylpyrimidin-4-yl o-methyl-phosphorothioate, was recovered at significant amounts in the pH 7 and 9 solutions did still contain the organophosphate moiety and therefore, may still have significant toxicological activity.

Drinking water assessment

Since there are no outdoor uses, the impact to water resources should be negligible; therefore, no drinking water assessment will be completed for this chemical.

3. Toxicity Summary

The available acute toxicity data on the TGA I indicate that pirimiphos-methyl is highly toxic to birds on an acute oral basis (LD50 = 40 mg/kg). It is highly toxic to birds on a subacute dietary basis (LC50 = 207 ppm). It is categorized as practically non toxic to mammals (LD50 = 2.4 g/kg). Pirimiphos methyl is highly to moderately toxic to freshwater fish (rainbow trout and fathead minnow) with LC50 values of 0.4 to 2.5 ppm respectively. It is very highly toxic to freshwater invertebrates (*Daphnia magna*) with an LC50 value of 0.21 ppb.

4. Data Gaps

71-4 a and 71-4b avian reproduction studies (northern bobwhite and mallard)

These studies are required for pirimiphos-methyl for the following reasons: (1) birds may be subject to repeated exposure to the pesticide, especially preceding and during the breeding season, (2) the pesticide is stable in the environment to the extent that potentially toxic amounts may persist in animal feed (3) field studies conducted with another pesticide have shown that the use of treated seeds may result in reproductive effects to birds, and (4) several million acres each year are planted with corn and sorghum seeds treated with pirimiphos methyl.

5. Risk Assessment

Terrestrial Organisms

No levels of concern (LOCs) are exceeded for birds or mammals.

Aquatic organisms

No levels of concern (LOCs) are exceeded for freshwater fish and invertebrates.

6. Labeling Requirements

Manufacturing-Use Products

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

End-use Products

This pesticide is toxic to birds, fish and aquatic invertebrates. Do not apply directly to water. Do not contaminate water by cleaning of equipment or disposal of water.

ENVIRONMENTAL ASSESSMENT

1. Ecological Toxicity Data

a. Toxicity to Terrestrial Animals

i. Birds, Acute and Subacute

An acute oral toxicity study using the technical grade of the active ingredient (TGAI) is required to establish the toxicity of Pirimiphos-methyl to birds. The preferred test species is either mallard duck (a waterfowl) or bobwhite quail (an upland gamebird). Results of this test are tabulated below.

Avian Acute Oral Toxicity

Species	% ai	LD50 (mg/kg)	Toxicity Category	MRID No. Author/Year	Study Classification ¹
Northern bobwhite quail (<i>Colinus virginianus</i>)	89.8	40.0	Highly toxic	434421-01 Campbell/ 1994	Core

¹ Core (study satisfies guideline).

Since the LD50 value falls in the range of 10-50 mg/kg, pirimiphos-methyl is categorized highly toxic to avian species on an acute oral basis. The guideline (71-1) is fulfilled (MRID 434421-01).

Two subacute dietary studies using the TGAI are required to establish the toxicity of pirimiphos-methyl to birds. The preferred test species are mallard duck and bobwhite quail. Results of these tests are tabulated below.

Avian Subacute Dietary Toxicity

Species	% ai	5-Day LC50 (ppm) ¹	Toxicity Category	ACC/MRID Author/Year	Study Classification
Northern bobwhite quail (<i>Colinus virginianus</i>)	89.3	298	highly toxic	420370-01 Hakin/1990	Supplemental ²
Northern bobwhite quail (<i>Colinus virginianus</i>)	89.3	284	highly toxic	420370-01 Hakin/1990	Supplemental ²
Northern bobwhite quail (<i>Colinus virginianus</i>)	Technical	207	highly toxic	097679 Fink/1979	Core
Mallard duck (<i>Anas platyrhynchos</i>)	Technical	633	moderately toxic	097679 Fink/1974	Core

¹ Test organisms observed an additional three days while on untreated feed.

² Supplemental (study is scientifically sound, but does not satisfy guideline).

Test material stability under test conditions was not confirmed analytically. Pirimiphos-methyl (technical material) may photodegrade and volatilize quickly under test conditions.

Since the lowest LC50 value falls in the range of 50-500 ppm, pirimiphos-methyl is categorized highly toxic to avian species on a subacute dietary basis. The guideline (71-2) is fulfilled (ACC. 097679).

ii. Birds, Chronic

The guideline requirements 71-4 a and 71-4 b are not fulfilled. Avian reproduction studies using the TGAI are required for pirimiphos-methyl because the following conditions are met: (1) birds may be subject to repeated exposure to the pesticide, especially preceding or during the breeding season and, (2) the pesticide is stable in the environment to the extent that potentially toxic amounts may persist in animal feed, (3) field studies conducted with the another insecticide have shown that the use of treated seeds may result in reproductive effects to birds, (Blus and Henry 1997) and (4) several million acres each year are planted to corn and sorghum seeds treated with pirimiphos methyl.

iii. Mammals, Acute and Chronic

Wild mammal testing is required on a case-by-case basis, depending on the results of lower tier laboratory mammalian studies, intended use pattern and pertinent environmental fate characteristics. In most cases, rat or mouse toxicity values obtained from the Agency's Health Effects Division (HED) substitute for wild mammal testing. These toxicity values are reported in the table below.

Mammalian Toxicity					
Species/ Study Duration	% ai	Test Type	Toxicity Value	Affected Endpoints	MRID No.
rat	75.0 (formulation)	Acute oral	2.4 g/kg	mortality	00126257
rat	88.5	Developmental	NOEL \geq 150 mg/kg/day	developmental	43726801
rabbit	86.7	Developmental	NOEL \geq 48 mg/kg/day	developmental	43206301
rat	87.7	Reproduction	NOEL \geq 160 ppm (for males) (13.72 mg/kg/day)	None	43726801

An analysis of the results indicate that pirimiphos-methyl is categorized as practically non toxic to small mammals on an acute oral, developmental, and reproductive basis.

iv. Insects

A honey bee acute contact study using the TGAI is not required for pirimiphos-methyl because its uses are not expected to result in significant honey bee exposure.

b. Toxicity to Freshwater Aquatic Animals

i. Freshwater Fish, Acute

Two freshwater fish toxicity studies using the TGAI are required to establish the toxicity of pirimiphos methyl to fish. The preferred test species are rainbow trout (a coldwater fish) and bluegill sunfish (a warmwater fish). Results of these tests are tabulated below.

Freshwater Fish Acute Toxicity					
Species/ Flow-through or Static	% ai	96-hour LC50 (ppm)	Toxicity Category	MRID No. Author/Year	Study Classification
Rainbow trout (<i>Oncorhynchus mykiss</i>) static	88.9	0.4	highly	097679 Hill/1978	core
Rainbow trout (<i>Oncorhynchus mykiss</i>) Flow-through	84	1.16	moderately	097679 Hill/1975	core
Bluegill Sunfish flow-through	84	2.86	moderately	0976779 Hill/1975	core
Fathead minnow (<i>Pimephales promelas</i>) flow-through	88.9	2.5	moderately	097679 Hill/1978	core

Since the lowest LC50 value falls in the range of 0.1 to 1.0 ppm, pirimiphos-methyl is categorized as highly toxic to freshwater fish on an acute basis. The guideline (72-1) is fulfilled (MRID No. 097670).

ii. Freshwater Invertebrates, Acute

A freshwater aquatic invertebrate toxicity test using the TGAI is required to establish the toxicity of pirimiphos-methyl to aquatic invertebrates. The preferred test species is *Daphnia magna*. Results of this test are tabulated below.

Freshwater Invertebrate Acute Toxicity					
Species/Static or Flow-through	% ai	48-hour LC50/ EC50 (ppb)	Toxicity Category	MRID No. Author/Year	Study Classification
Waterflea (<i>Daphnia magna</i>)	50	0.11	very highly toxic	097679 Evered/1976	supplemental
Waterflea (<i>Daphnia magna</i>)	99.5	0.21	very highly toxic	097679 Evered/1976	core

Since the LC50 is <0.1 ppm, pirimiphos-methyl is categorized as very highly toxic to aquatic invertebrates on an acute basis. The guideline (72-2) is fulfilled (MRID No. 097679).

c. Toxicity to Plants

Currently, plant testing is not required for pesticides other than herbicides except on a case-by-case basis (*e.g.*, labeling bears phytotoxicity warnings incident data or literature that demonstrate phytotoxicity). Pirimiphos-methyl use is not expected to result in significant exposure to nontarget plants. Therefore, no plant toxicity testing is required.

2. Exposure Characterization

According to acceptable hydrolysis studies (MRID's 42982401 and 43177601), pirimiphos-methyl degraded in sterile buffered solutions with half-lives of 7.3 days at pH 5, 79.0 days at pH 7, and 54.0-62.0 days in pH 9. The main hydrolysis degradate recovered from all three pH's was 2 (diethylamino)-4-hydroxy-6-methyl pyrimidine (aka 2-diethylamino-6-methylpyrimidin-4-ol). This compound does not contain the O-P moiety. However, a second degradate which accounted for a maximum of 30-39% of the applied radioactivity in the pH 7 and pH 9 solutions was O-2-diethylamino-6-methylpyrimidin-4-yl o-methyl-phosphorothioate which does retain the O-P moiety and therefore, may still have significant toxicological activity.

Pirimiphos methyl is soluble in water at 5 ppm at 20 degrees C. It hydrolyzes rapidly at acidic pHs and is relatively stable at neutral and alkaline pH. The main hydrolysis degradate recovered from all three pH's was 2 (diethylamino)-4-hydroxy-6-methyl pyrimidine. A second degradate, O-2-diethylamino-6-methylpyrimidin-4-yl o-methyl-phosphorothioate, was recovered at significant amounts in the pH 7 and 9 solutions.

Data were reviewed for pirimiphos-methyl in 1979 and the assessment was retained in the EFGWB files. This assessment of Acc # 097680 reported that pirimiphos-methyl hydrolyzed rapidly under both acid and alkaline incubation conditions and was relatively stable to hydrolysis in pH 7 buffered solution. Pirimiphos-methyl was photolabile with half-lives of less than one day when irradiated with natural light. In non-sterile soils, pirimiphos-methyl degraded under aerobic and anaerobic conditions with half-lives of approximately 2 weeks. Common degradates were listed for hydrolysis, photodegradation and microbial metabolism. No mobility data were included in the 1979 review, however, many organophosphate insecticides do leach into the soil profile. It would be reasonable to assume that pirimiphos-methyl may also be mobile.

Scientists in EFED also considered a British report (Evaluation of Pirimiphos-methyl: Review of use in Agriculture, Horticulture, Food Storage Practice and Home Gardens. The Food and Environment Protection Act, 1985, Part III. Issue 30# 167 published by Pesticides Safety Directorate, York Y01 2PX). In Britain, pirimiphos-methyl can be used on a number of ornamental, orchard and vegetable crops as well as on stored grain. Incubation of non-formulated or formulated product on several soils under aerobic or anaerobic conditions resulted in DT50's of 3.5-25 days; the longer half-lives were seen with higher application rates. The major degradate was 2-diethylamino-6-methylpyrimidin-4-ol which was also as the major hydrolysis product in EPA reviewed documents. Pirimiphos-methyl degraded rapidly when exposed to natural sunlight on silica gel plates.

No adequate mobility studies were reported. A soil Koc was approximated from the Kow; this approximation suggested that pirimiphos-methyl was not very mobile in soil. There were some detections of pirimiphos-methyl in groundwater; however, the data are very limited. It is not possible to determine the mobility potential of pirimiphos-methyl without further information.

3. Ecological Exposure and Risk Characterization

Risk characterization integrates the results of the exposure and ecotoxicity data to evaluate the likelihood of adverse ecological effects. This integration is called the quotient method. Risk quotients (RQs) are calculated by dividing exposure estimates by acute and chronic ecotoxicity values.

$$RQ = \text{EXPOSURE} / \text{TOXICITY}$$

RQs are then compared to OPP's levels of concern (LOCs). These LOCs are used by OPP to analyze potential risk to nontarget organisms and the need to consider regulatory action. The criteria indicate that a pesticide used as directed has the potential to cause adverse effects on nontarget organisms. LOCs currently address the following risk presumption categories: (1) **acute high** -- potential for acute risk is high; regulatory action may be warranted in addition to restricted use classification, (2) **acute restricted use** -- the potential for acute risk is high, but may be mitigated through restricted use classification, (3) **acute endangered species** - endangered species may be adversely affected, and (4) **chronic risk** - the potential for chronic risk is high regulatory action may be warranted. Currently, EFED does not perform assessments for chronic risk to plants, acute or chronic risks to nontarget insects, or chronic risk from granular/bait formulations to birds or mammals.

The ecotoxicity test values (measurement endpoints) used in the acute and chronic risk quotients are derived from required studies. Examples of ecotoxicity values derived from short-term laboratory studies that assess acute effects are: (1) LC50 (fish and birds), (2) LD50 (birds and mammals), (3) EC50 (aquatic plants and aquatic invertebrates) and (4) EC25 (terrestrial plants). Examples of toxicity test effect levels derived from the results of long-term laboratory studies that assess chronic effects are: (1) LOEC (birds, fish, and aquatic invertebrates), (2) NOEC (birds, fish and aquatic invertebrates), and (3) MATC (fish and aquatic invertebrates). For birds and mammals, the NOEC generally is used as the ecotoxicity test value in assessing chronic effects, although other values may be used when justified. Generally, the MATC (defined as the geometric mean of the NOEC and LOEC) is used as the ecotoxicity test value in assessing chronic effects to fish and aquatic invertebrates. However, the NOEC is used if the measurement end point is production of offspring or survival.

Risk presumptions and the corresponding RQs and LOCs, are tabulated below.

Risk Presumptions for Terrestrial Animals

Risk Presumption	RQ	LOC
Birds		
Acute High Risk	EEC ¹ /LC50 or LD50/sqft ² or LD50/day ³	0.5
Acute Restricted Use	EEC/LC50 or LD50/sqft or LD50/day (or LD50 < 50 mg/kg)	0.2
Acute Endangered Species	EEC/LC50 or LD50/sqft or LD50/day	0.1
Chronic Risk	EEC/NOEC	1
Wild Mammals		
Acute High Risk	EEC/LC50 or LD50/sqft or LD50/day	0.5
Acute Restricted Use	EEC/LC50 or LD50/sqft or LD50/day (or LD50 < 50 mg/kg)	0.2
Acute Endangered Species	EEC/LC50 or LD50/sqft or LD50/day	0.1
Chronic Risk	EEC/NOEC	1

¹ abbreviation for Estimated Environmental Concentration (ppm) on avian/mammalian food items

² mg/ft² ³ mg of toxicant consumed/day

LD50 * wt. of bird LD50 * wt. of bird

Risk Presumptions for Aquatic Animals

Risk Presumption	RQ	LOC
Acute High Risk	EEC ¹ /LC50 or EC50	0.5
Acute Restricted Use	EEC/LC50 or EC50	0.1
Acute Endangered Species	EEC/LC50 or EC50	0.05
Chronic Risk	EEC/MATC or NOEC	1

¹ EEC = (ppm or ppb) in water

Risk Presumptions for Plants

Risk Presumption	RQ	LOC
Terrestrial and Semi-Aquatic Plants		
Acute High Risk	EEC ¹ /EC25	1
Acute Endangered Species	EEC/EC05 or NOEC	1
Aquatic Plants		
Acute High Risk	EEC ² /EC50	1
Acute Endangered Species	EEC/EC05 or NOEC	1

¹ EEC = lbs ai/A

² EEC = (ppb/ppm) in water

a. Exposure and Risk to Nontarget Terrestrial Animals

For the purpose of pirimiphos-methyl the following procedure for calculating exposure and risk was used: It was assumed that field corn, popcorn, and sorghum seeds are treated with a maximum of 12.3 fluid ounces of Actellic 5E (57% ai) resulting in 8.0 ppm pirimiphos-methyl on the seeds. Risk quotients were calculated using the EEC/LC50 and LD50/day, and the LD50/sq ft indices. The LC50 value for birds is 207 ppm. The LD50 value for birds is 40 mg/kg. Assuming 20 lbs of corn or sorghum grain are planted/acre, the following risk quotients are calculated:

i. Birds

$$1) \quad \text{EEC/LC50 index:} \quad \frac{8 \text{ ppm}}{207 \text{ ppm}} = 0.04$$

$$2) \quad \text{LD50/day index:}$$

Assuming that a song bird may consume 20% of its body weight/day in treated grain

$$\text{LD50/day} = \frac{\text{proportion of body weight a bird consumes per day} \times \text{EEC}}{\text{LD50}}$$

$$= \frac{0.20 \times 8 \text{ ppm}}{40 \text{ mg/kg}} = 0.04$$

These risk quotients do not exceed the endangered species, restricted use, or the high acute risk level of concern (LOC). Therefore, pirimiphos methyl does not present a high acute risk to birds.

ii. Mammals

Pirimiphos-methyl is much less acutely toxic to mammals than it is to birds. The LD50 value for mammals is 2,400 mg/kg. Therefore, it does not present an acute risk to mammals.

iii. Insects

Currently, EFED does not assess risk to nontarget insects. The registered uses for pirimiphos methyl are not expected to result in significant exposure to bees.

b. Exposure and Risk to Nontarget Freshwater Aquatic Animals

The registered uses for pirimiphos methyl are not expected to result in significant exposure to aquatic organisms. Therefore, it does not pose a high risk to aquatic organisms.

4. Data Gaps

71-4 a and 71-4b avian reproduction studies (northern bobwhite and mallard)

These studies are required for pirimiphos-methyl for the following reasons: (1) birds may be subject to repeated exposure to the pesticide, especially preceding and during the breeding season, (2) the pesticide is stable in the environment to the extent that potentially toxic amounts may persist in animal feed (3) field studies conducted with the insecticide heptachlor have shown that the use of treated seeds may result in reproductive effects to birds, (Blus and Henry 1997) and (4) several million acres each year are planted with corn and sorghum seeds treated with pirimiphos methyl.

5. Endangered Species

No endangered species LOCs are exceeded for pirimiphos-methyl. The Agency has developed a program (the “Endangered Species Protection Program”) to identify pesticides whose use may cause adverse impacts on endangered and threatened species, and to implement mitigation measures that will eliminate the adverse impacts. At present, the program is being implemented on an interim basis as described in a Federal Register notice (54 FR 27984-28008, July 3, 1989), and is providing information to pesticide users to help them protect these species on a voluntary basis. As currently planned, the final program will call for label modifications referring to required limitations on pesticide uses, typically as depicted in county-specific bulletins or by other site-specific mechanisms as specified by state partners. A final program, which may be altered from the interim program, will be described in a future Federal Register notice. The Agency is not imposing label modifications at this time through the RED. Rather, any requirements for product use modifications will occur in the future under the Endangered Species Protection Program.

6. Labeling Requirements

Manufacturing-Use Products

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

End-use Products

“This pesticide is toxic to birds, fish and aquatic invertebrates. Do not apply directly to water. Do not contaminate water by cleaning of equipment or disposal of water.”

Bibliography

Blus, L. J. and C. J. Henry. Field Studies on Pesticides and Birds: Unexpected and Unique Relations. *Ecological Applications*. 7(4). 1997. Pp. 1125-1132

Chemical No: 108102

DATA REQUIREMENTS FOR PIRIMIPHOS METHYL



Data Requirement	Use Pattern ¹	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA 3(c)(2)(B)?
§158.490 WILDLIFE AND AQUATIC ORGANISMS				
71-1(a) Acute Avian Oral, Quail/Duck	1	Yes	434421-01	No
71-2(a) Acute Avian Diet, Quail	1	Yes	097679	No
71-2(b) Acute Avian Diet, Duck	1	Yes	097679	No
71-3 Wild Mammal Toxicity	1			
71-4(a) Avian Reproduction Quail	1	No		Yes ²
71-4(b) Avian Reproduction Duck	1	No		Yes ²
71-5(a) Simulated Terrestrial Field Study	1			
71-5(b) Actual Terrestrial Field Study	1			
72-1(a) Acute Fish (warm water) Toxicity	1	Yes	0976770	No
72-1(b) Acute Fish Toxicity Bluegill (TEP)	1			
72-1© Acute Fish Toxicity Rainbow Trout	1	Yes	0976770	No
72-1(d) Acute Fish Toxicity Rainbow Trout (TEP)	1			
72-2(a) Acute Aquatic Invertebrate	1	Yes	097679	No
72-2(b) Acute Aquatic Invertebrate (TEP)	1			No
72-3(a) Acute Est/Mar Toxicity Fish	1			No
72-3(b) Acute Est/Mar Toxicity Mollusk	1			No
72-3© Acute Est/Mar Toxicity Shrimp	1			No
72-3(d) Acute Est/Mar Toxicity Fish (TEP)	1			No
72-3(e) Acute Est/Mar Toxicity Mollusk (TEP)	1			No
72-3(f) Acute Est/Mar Toxicity Shrimp (TEP)	1			No
72-4(a) Early Life Stage Fish	1			No
72-4(b) Life Cycle Aquatic Invertebrate	1			No
72-5 Life Cycle Fish	1			No
72-6 Aquatic Organism Accumulation	1			No
72-7(1) Simulated Aquatic Field Study	1			No
72-7(b) Actual Aquatic Field Study	1			No
§158.540 PLANT PROTECTION				
122-1(a) Seed Germ.,Seedling Emergence	1			No
122-2 Aquatic Plant Growth	1			No
122-1(a) Seed Germ./Seedling Emerg.	1			No
122-1(b) Vegetative Vigor	1			No
123-1(a) Seed Germ./Seedling Emerg.	1			No
123-1(b) Vegetative Vigor	1			No
123-2 Aquatic Plant Growth	1			No

Data Requirement	Use Pattern ¹	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA 3(c)(2)(B)?
124-1 Terrestrial Field Study	1			No
124-2 Aquatic Field Study	1			No
§158.490 NONTARGET INSECT TESTING				
141-1 Honey Bee Acute Contact	1			No
141-2 Honey Bee Residue on Foliage	1			No
141-5 Field Test for Pollinators	1			
§158.290 ENVIRONMENTAL FATE				
<u>Degradation Studies-Lab:</u>				
161-1 Hydrolysis		yes	42982401 43177601	No
161-2 Photodegradation In Water	1			No
161-3 Photodegradation On Soil	1			No
<u>Metabolism Studies-Lab:1</u>				
162-1 Aerobic Soil	1			No
162-2 Anaerobic Soil	1			No
<u>Mobility Studies:1</u>				
163-1 Leaching- Adsorption/Desorp.	1			No
163-2 Volatility (Lab)	1			No
<u>Dissipation Studies-Field:</u>				
164-1 Soil	1			No
<u>Accumulation Studies:</u>				
165-4 In Fish	1			No
<u>Ground Water Monitoring Studies:</u>				
166-1 Small-Scale Prospective	1			No
§158.440 SPRAY DRIFT				
201-1 Droplet Size Spectrum	1			No
202-1 Drift Field Evaluation	1			No

FOOTNOTES:

1. 1=Terrestrial Food; 2=Terrestrial Feed; 3=Terrestrial Non-Food; 4=Aquatic Food; 5=Aquatic Non-Food(Outdoor);6=Aquatic Non-Food (Industrial);7=Aquatic Non-Food (Residential);8=Greenhouse Food; 9=Greenhouse Non-Food;10= Forestry; 11=Residential Outdoor; 12=Indoor Food; 13=Indoor Non-Food; 14=Indoor Medicinal;15=Indoor Residential.

2. These studies are required for pirimiphos-methyl for the following reasons: (1) birds may be subject to repeated exposure to the pesticide, especially preceding and during the breeding season, (2) the pesticide is stable in the environment to the extent that potentially toxic amounts may persist in animal feed (3) field studies conducted with another pesticide have shown that the use of treated seeds may result in reproductive effects to birds, and (4) several million acres each year are planted to corn and sorghum seeds treated with pirimiphos methyl.